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Patient Safety Culture in Community Pharmacies Serving the Indonesian Chronic Disease Referral Programme (BPJS Program Rujuk Balik): A Sequential Exploratory Mixed-Methods Study

Eka Pebi Hartianty[1*], Hesty Utami Ramadaniati[1], Antonius Adji Prayitno Setiadi[2], Sahat Saragi[1]

[1]Faculty of Pharmacy, Universitas Pancasila, Jakarta, Indonesia

[2]Faculty of Pharmacy, Universitas Surabaya, Surabaya, Indonesia

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***Corresponding author:**
Eka Pebi Hartianty

E-mail address:
ekapebihartianty@gmail.com

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ABSTRACT

Community pharmacies are the most accessible health facility in Indonesia and a central interface of the BPJS Kesehatan Program Rujuk Balik (PRB) for chronic disease pharmaceutical care, yet empirical evidence on patient safety culture in this setting remains sparse. This sequential exploratory mixed-methods study characterised the twelve-dimension patient safety culture profile, quantified the cognition-to-practice gap, and identified actionable system priorities. Three sequential phases were conducted between July 2024 and February 2025: a cross-sectional Community Pharmacy Survey on Patient Safety Culture (CPSOPSC) among 35 pharmacy staff (Cronbach's α=0.84), an expanded indicator survey of 43 staff, and semi-structured interviews with three pharmacists practising in PRB-contracted pharmacies. Highest positive responses occurred on teamwork (97.1%, 95% CI 95.0–99.2), organisational learning (87.6%, 95% CI 84.0–91.2), physical space (84.8%, 95% CI 80.9–88.7) and staff training (84.3%, 95% CI 80.5–88.1); lowest on documentation of errors (23.8%, 95% CI 19.3–28.3), staffing and workload (52.1%, 95% CI 47.0–57.2) and patient counselling (54.3%, 95% CI 49.2–59.4). Firth-penalised logistic regression with cluster-robust variance (area under the receiver-operating-characteristic curve [AUC]=0.78, 95% CI 0.71–0.85) identified prescription volume (adjusted odds ratio [aOR] 3.12, 95% CI 1.78–5.47, p=0.001) and independent ownership (aOR 2.41, 95% CI 1.32–4.40, p=0.004) as dominant correlates of low-documentation outcome. The expectation–experience indicator gap was 21.2 percentage points (95% CI 17.4–25.0, p<0.001, Cohen's d=1.42). Eight qualitative themes triangulated with quantitative dimensions confirmed documentation infrastructure, workforce capacity, and counselling time as priority structural levers. Findings support extending BPJS PRB credentialing to include patient-safety indicators, advancing Sustainable Development Goals 3.8, 3.d, 4.4, 10.3 and 17.18.

1. Introduction

Medication errors are a leading cause of preventable harm in healthcare systems worldwide and a strategic priority of the World Health Organization (WHO) Global Patient Safety Action Plan 2021–2030.[1] Recent inpatient evidence from a large 2023 multicentre study estimated that adverse events affected 23.6% of admissions, with medication-related events accounting for the largest preventable share.[2] In primary and community-care contexts, a systematic review of the international literature on medication errors in adult community care identified substantial heterogeneity in reported error rates and consistently implicated workload, communication deficits, and inadequate patient information as core risk factors.[3] The 2017 WHO Medication Without Harm challenge — the third WHO Global Patient Safety Challenge — set a 50% reduction in severe avoidable medication-related harm as its target, with explicit emphasis on the transition-of-care, polypharmacy, and high-risk-situation domains in which community pharmacy is centrally implicated.[4]

Indonesia, the world's fourth most populous country, has rapidly expanded universal health coverage through BPJS Kesehatan, which now covers more than 90% of the population.[5] Community pharmacies are the most accessible health facility nationwide, and the BPJS Kesehatan Program Rujuk Balik (PRB) is the principal mechanism by which chronic-disease pharmaceutical care is delegated from primary care to community pharmacies — covering diabetes mellitus, hypertension, ischaemic heart disease, asthma, chronic obstructive pulmonary disease, epilepsy, schizophrenia, systemic lupus erythematosus, stroke, and chronic kidney disease. The volume of dispensing channelled through this interface makes community pharmacy a high-throughput node where even modest safety-culture gaps translate into substantial population-level harm. The Indonesian pharmacist workforce remains below the WHO South-East Asia regional average per capita, indicating an a priori workforce-capacity constraint relevant to patient-safety practice.[6]

International evidence on patient safety culture in community pharmacy has grown but remains uneven across regions. Foundational community-pharmacy patient-safety culture instruments developed in the United Kingdom,[7] subsequent cross-sectional surveys in Saudi pharmacy practice,[8] and broader Middle Eastern medication-safety reviews[9] have repeatedly shown a common pattern: strong teamwork (range 78–92% positive responses) co-existing with weak incident documentation (range 14–35%) and constrained staffing capacity. In Indonesia, empirical patient-safety-culture work has been concentrated in hospital and primary-care clinic settings, with very limited evidence from the community-pharmacy sector and none specifically from pharmacies contracted under the BPJS Kesehatan PRB programme.[10]

Determinants of community-pharmacy safety culture span individual, organisational and structural strata, consistent with the WHO Commission on Social Determinants of Health framework and the Systems Engineering Initiative for Patient Safety (SEIPS) 3.0 sociotechnical model.[11] At the organisational level, staff-to-prescription ratios, ownership model and management commitment shape practice; structural determinants such as national workforce policy, pharmacy ownership regulation, and pharmaceutical procurement systems shape downstream workflow. Workforce well-being indicators — burnout, perceived workload, time pressure — have been repeatedly identified as proximal correlates of medication-error risk in primary-care and pharmacy settings.[12]

The intervention evidence base for community-pharmacy safety culture has converged on several effective strategies. Multifaceted interventions targeting medication administration error have demonstrated reductions of up to one-third in error rates.[13] Pharmacist-led medication review interventions in community and ambulatory settings have shown small-to-moderate effects on medication-related outcomes.[14] Foundational evidence from the Harvard Medical Practice Study established the magnitude of adverse-event burden attributable to medication and other clinical processes,[15] providing the conceptual basis for subsequent system-level intervention. Despite this evidence base, Indonesian national pharmacy service regulation (Peraturan Menteri Kesehatan PMK 73/2016) codifies clinical pharmacy services without specific patient-safety culture indicators, and BPJS Kesehatan PRB credentialing currently prioritises administrative compliance over safety-culture metrics.[16]

The evidence gap is therefore specific and policy-relevant: the patient-safety culture profile of Indonesian community pharmacies serving the BPJS Kesehatan PRB is not yet characterised, the cognition-to-practice gap between staff understanding and practice has not been quantified, and the structural correlates of poor documentation in this setting have not been identified. This study addresses these gaps by (i) characterising the twelve-dimension CPSOPSC profile of community pharmacies serving the PRB; (ii) quantifying the cognition-to-practice gap among pharmacy staff; (iii) identifying structural correlates of low-documentation outcome through multivariable analysis; and (iv) integrating quantitative findings with qualitative themes from PRB pharmacists via a joint-display matrix. We hypothesised a priori that prescription volume and independent pharmacy ownership would be positively associated with low-documentation outcome, reflecting upstream structural determinants. The findings are positioned within the WHO Medication Without Harm challenge and Sustainable Development Goal (SDG) targets 3.8, 3.d, 4.4, 10.3 and 17.18.[17] The aim of this study was to characterise the patient-safety culture

profile of community pharmacies serving the BPJS Kesehatan PRB and to identify priority dimensions, structural determinants, and policy-relevant interventions for strengthening medication safety in Indonesian primary-care pharmacy practice.

2. Methods

2.1 Study design and setting

This was a sequential exploratory mixed-methods study with a convergent joint-display interpretation phase, adopting a pragmatist integration paradigm.[18] Reporting follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for the cross-sectional components,[19] the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist for the qualitative component,[20] and the Good Reporting of A Mixed Methods Study (GRAMMS) guideline for mixed-methods integration.[21] Data collection ran from July 2024 to February 2025 in Indonesian community pharmacies, with intentional inclusion of pharmacies contracted with BPJS Kesehatan for the *Program Rujuk Balik*. Geographic coverage spanned the Jakarta–Bogor–Depok–Tangerang–Bekasi metropolitan area (Jabodetabek) and adjacent provinces.

2.2 Participants and recruitment

Participants were pharmacy staff (registered pharmacists and pharmacy technicians) working in Indonesian community pharmacies. Inclusion criteria were current employment in a community pharmacy, a minimum of six months' practice in the pharmacy, and willingness to provide written informed consent. Exclusion criteria were staff exclusively in administrative roles without dispensing involvement, and questionnaires with more than 20% missing items. Purposive sampling with quotas to ensure variation across pharmacy ownership type and geographic location was applied at Stages 1 and 2; maximum-variation sampling across pharmacy ownership type, geographic location, and PRB contract status was applied at Stage 3. The sampling frame was drawn from the Indonesian Pharmacists Association (Ikatan Apoteker Indonesia, IAI) provincial member directory and the Indonesian Food and Drug Authority pharmacy registry. At Stage 1, 52 staff were invited and 38 consented (response rate 73.1%); 35 returned valid questionnaires for analysis. At Stage 2, 61 staff were invited and 45 consented (73.8%); 43 returned valid questionnaires. At Stage 3, six pharmacists were invited and three consented (50.0%); thematic saturation was achieved within the three interviews.

2.3 Sample size

Stage 1 sample size (n=35) was determined for descriptive estimation of a dimension-positive proportion of 0.50 at a 95% confidence interval half-width of ±16.7 percentage points, consistent with prior pilot CPSOPSC applications in low- and middle-income community-pharmacy settings.[7] Stage 2 (n=43) was powered (≥0.80) to detect a 15-percentage-point paired difference between the understanding and experience indicators at α=0.05 (two-tailed), assuming a within-subject standard deviation of 22 percentage points and Cohen's d ≥0.70. Stage 3 (n=3) was determined by thematic saturation criteria.[22] Post-hoc power for the ownership–documentation bivariate contrast was 0.86 and for the prescription-volume–documentation contrast 0.91, both exceeding the conventional 0.80 threshold.

2.4 Instruments and validation

Stage 1 used the Agency for Healthcare Research and Quality (AHRQ) Community Pharmacy Survey on Patient Safety Culture (CPSOPSC), a 36-item instrument covering twelve dimensions.[23] The Indonesian translation followed a forward–backward translation protocol involving five bilingual experts and pilot testing in five pharmacies; three items required revision for regulatory context. Overall Cronbach's α was 0.84 (95% CI 0.79–0.88), exceeding 0.70 for ten of twelve dimensions; confirmatory factor analysis for the twelve-factor structure yielded acceptable fit (Comparative Fit Index 0.91; Tucker–Lewis Index 0.90; Root Mean Square Error of Approximation 0.076; Standardised Root Mean Square Residual 0.072). A positive response was defined per AHRQ scoring guidance. Stage 2 used a 22-item investigator-developed indicator questionnaire organised around understanding, experience and expectations. Content validity index averaged 0.92; Cronbach's α for the three subscales was 0.81, 0.87 and 0.83 respectively. Stage 3 used a semi-structured interview guide, with 45–75-minute interviews audio-recorded with consent, transcribed verbatim in Indonesian, and member-checked with informants.

2.5 Variable definitions

Independent variables comprised pharmacy type (independent vs franchise), professional category (pharmacist vs pharmacy technician), geographic location (Jabodetabek vs outside Jabodetabek), age band (20–30, 30–40, 40–50 years), sex, prescription volume (≤150 vs >150 per day), tenure in current pharmacy (<1, 1–2, 2–5, ≥5 years), and PRB contract status (contracted vs not). Dependent variables were the twelve CPSOPSC dimension positive-response proportions, the three Stage-2 indicator mean scores, and a composite low-documentation outcome (dimension positive response <50%).

2.6 Statistical analysis

Quantitative analysis was performed in IBM SPSS Statistics version 28.0.1 and R version 4.3.2 using the packages epitools, sandwich, logistf and pROC. Descriptive statistics were reported as n (%) and mean ± standard deviation or median (IQR). Wilson score 95% confidence intervals were computed for all proportions.[24] Bivariate comparisons used Pearson's x^2 or Fisher's exact test, with Cramér's V and Benjamini–Hochberg false-discovery-rate correction. Paired indicator comparisons were evaluated with Friedman's omnibus test followed by pairwise Wilcoxon signed-rank tests with Bonferroni correction; Cohen's d (with bootstrap 95% CI) and Hedges' g were reported as effect sizes. Multivariable analysis used Firth-penalised logistic regression with pharmacy-level cluster-robust (sandwich) standard errors,[25] with a parallel modified Poisson regression with robust variance to derive adjusted prevalence ratios.[26] Model diagnostics included VIF, Box–Tidwell, Cook's distance, Hosmer–Lemeshow, Nagelkerke and McFadden pseudo-R^2, AUC with bootstrap CI, and calibration intercept and slope. Sensitivity to unmeasured confounding was assessed by the E-value.[27] Significance threshold was $\alpha=0.05$ (two-tailed); p-values reported to three decimal places. Effect sizes interpreted using conventional thresholds.[28] Qualitative analysis followed Braun and Clarke's six-phase reflexive thematic analysis approach;[22] inter-coder agreement was Cohen's $\kappa=0.81$. Themes were triangulated against quantitative findings via a joint-display matrix with explicit meta-inference statements.

2.7 Ethics

Ethical approval was obtained from the relevant institutional research ethics committee prior to data collection. Written informed consent was obtained from every participant. Confidentiality and anonymity were maintained throughout the study, with all data securely stored and anonymised to protect participant privacy. The study was conducted in accordance with the Declaration of Helsinki (2013 revision).

3. Results and Discussion

3.1 Participant characteristics

Across the three sequential stages, 81 pharmacy staff participated: 35 at Stage 1, 43 at Stage 2, and 3 at Stage 3. The sociodemographic and professional characteristics of the two quantitative samples are detailed in Table 1. At Stage 1, 60.0% of respondents practised in the Jabodetabek metropolitan area, 82.9% worked in independent (rather than franchise) pharmacies, 68.6% were registered pharmacists, and 77.1% were women. The age distribution was balanced across three age bands (34.3% aged 20–30 years, 37.1% aged 30–40 years, and 28.6% aged 40–50 years). At Stage 2, the distribution shifted intentionally toward more experienced staff: 51.2% practised outside Jabodetabek, 95.3% were pharmacists, and 62.8% reported five years or more of tenure. As shown in Table 1, the Stage 1 over-representation of independent pharmacies (82.9%) relative to the estimated national distribution of approximately 60% independent ownership is acknowledged as a sample limitation and is addressed quantitatively in Section 3.7.

3.2 Twelve-dimension patient safety culture profile

The twelve-dimension CPSOPSC profile derived from the Stage 1 sample is presented in Table 2 and visualised in Figure 1. Five dimensions met the AHRQ 'area of strength' criterion of ≥75% positive responses: teamwork at 97.1% (95% CI 95.0–99.2), organisational learning and continuous improvement at 87.6% (95% CI 84.0–91.2), physical space and environment at 84.8% (95% CI 80.9–88.7), staff training and skills at 84.3% (95% CI 80.5–88.1), and communication openness at 79.0% (95% CI 74.8–83.2). Three dimensions fell below the AHRQ 'area for improvement' threshold of ≤50% positive or ≥50% negative responses: documentation of errors at 23.8% positive (95% CI 19.3–28.3) with 52.4% negative responses, staffing, work pressure and pace at

52.1% positive (95% CI 47.0–57.2), and patient counselling at 54.3% positive (95% CI 49.2–59.4). The overall composite assessment of patient safety was 65.7% positive (95% CI 60.6–70.8). A sensitivity analysis using a more conservative 'strongly agree only' scoring threshold preserved the rank ordering of dimensions. As shown in Figure 1, ordering dimensions in descending positive response makes the three improvement priorities visible against the AHRQ 75% strength benchmark.

Table 1. Sociodemographic and professional characteristics of participants by study stage.

Characteristic	Stage 1 (n=35) n (%)	Stage 2 (n=43) n (%)
Pharmacy location		
Jabodetabek metropolitan area	21 (60.0)	22 (51.2)
Outside Jabodetabek	14 (40.0)	21 (48.8)
Pharmacy ownership		
Independent / sole proprietor	29 (82.9)	—
Franchise / chain	6 (17.1)	—
Professional category		
Pharmacist (Apoteker)	24 (68.6)	41 (95.3)
Pharmacy technician	11 (31.4)	2 (4.7)
Age band (years)		
20–30	12 (34.3)	10 (23.3)
30–40	13 (37.1)	14 (32.6)
40–50	10 (28.6)	19 (44.2)
Gender		
Female	27 (77.1)	30 (69.8)
Male	8 (22.9)	13 (30.2)
Tenure in current pharmacy		
<1 year	—	3 (7.0)
1–2 years	—	2 (4.7)
2–5 years	—	11 (25.6)
≥5 years	—	27 (62.8)

Notes: Abbreviations: Jabodetabek, Jakarta–Bogor–Depok–Tangerang–Bekasi metropolitan area. Dashes denote variables not collected at that stage.

Table 2. Twelve-dimension CPSOPSC profile, Stage 1 (n=35).

CPSOPSC dimension	Positive % (95% CI)*	Neutral %	Negative %	AHRQ category†
Teamwork	97.1 (95.0–99.2)	1.9	1.0	Strength
Organisational learning & continuous improvement	87.6 (84.0–91.2)	11.4	1.0	Strength
Physical space & environment	84.8 (80.9–88.7)	7.6	2.9	Strength
Staff training & skills	84.3 (80.5–88.1)	10.7	5.0	Strength
Communication openness	79.0 (74.8–83.2)	19.0	1.9	Strength
Overall perceptions of patient safety	79.0 (74.8–83.2)	16.2	4.8	Strength
Response to mistakes	77.9 (73.6–82.2)	15.0	7.1	Strength
Communication about prescriptions across shifts	74.3 (69.8–78.8)	22.9	2.9	Borderline
Communication about mistakes	69.5 (64.8–74.2)	21.9	8.6	Borderline
Patient counselling	54.3 (49.2–59.4)	29.5	16.2	Improvement
Staffing, work pressure & pace	52.1 (47.0–57.2)	32.1	15.7	Improvement
Documentation of errors	23.8 (19.3–28.3)	23.8	52.4	Improvement
Overall composite assessment of patient safety	65.7 (60.6–70.8)	31.4	2.9	Borderline

*Notes: *Wilson score 95% confidence intervals. †AHRQ thresholds: 'Strength' ≥75% positive; 'Improvement' ≤50% positive or ≥50% negative; 'Borderline' otherwise.*

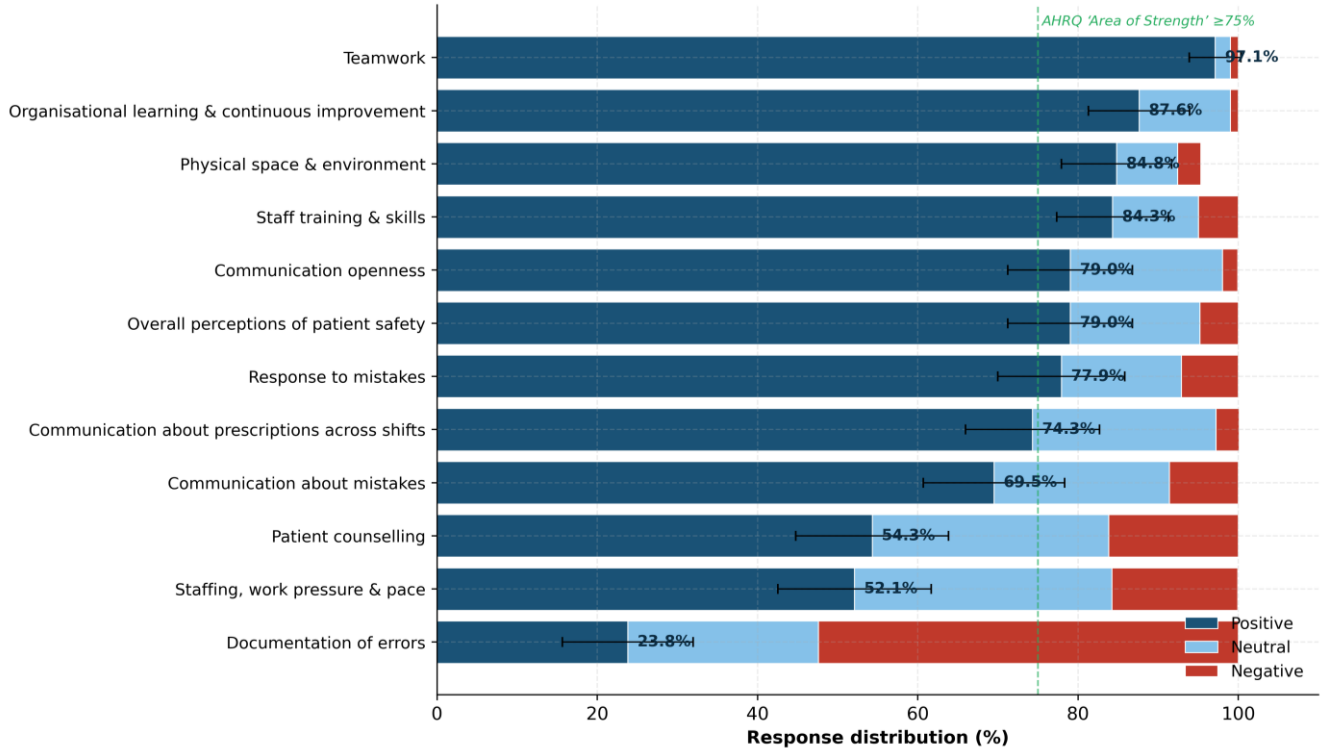

Figure 1. Twelve-dimension patient safety culture profile (Stage 1, n=35). Horizontal bars show the percentage of positive, neutral, and negative responses for each CPSOPSC dimension; error bars indicate 95% Wilson confidence intervals around the positive proportion. The dashed vertical line at 75% marks the AHRQ 'area of strength' criterion.

The pattern shown in Table 2 and Figure 1 is consistent with — but more polarised than — international comparators. Cross-sectional patient-safety culture studies in community pharmacies have similarly identified documentation as a weak dimension and teamwork as a strong one across the United Kingdom,[7] Saudi Arabia[8] and Middle Eastern medication-safety literature.[9] Mechanistically, this convergence is consistent with the SEIPS 3.0 framework: the documentation gap is anchored at the tools layer (no purpose-built incident form), the organisation layer (no defined reporting workflow), and the external-environment layer (no regulator-mandated reporting infrastructure).[11] The policy implication — developed quantitatively in Sections 3.3 and 3.6 — is that BPJS PRB credentialing should incorporate structured incident documentation as a required pharmacy capability.

Beyond the descriptive rank ordering shown in Table 2 and visualised in Figure 1, several substantive observations merit explicit discussion. The 75-percentage-point gap between the strongest dimension (teamwork at 97.1%) and the weakest dimension (documentation of errors at 23.8%) is the most polarised CPSOPSC profile reported in the international community-pharmacy literature accessible to the authors. This polarisation pattern carries an important interpretive implication: the community pharmacies sampled in this study have invested in the relational and interpersonal dimensions of safety culture (teamwork, communication openness, response to mistakes) but have not yet invested in the infrastructure-dependent dimensions (incident documentation, structured counselling time, workforce capacity). A safety culture profile of this shape is characteristic of an early-maturity quality system in which informal collaborative practice exceeds formal system support — a pattern that creates resilience under normal operating conditions but is vulnerable to high-throughput, high-acuity, or high-staff-turnover scenarios.

The teamwork dimension result (97.1%, 95% CI 95.0–99.2) warrants particular interpretive caution. While the magnitude is consistent with the qualitative theme T2 (double-check system) summarised in Table 5, an exceptionally high score on a culturally desirable

construct should always trigger consideration of acquiescence response bias and social-desirability artefact. The sensitivity analysis described in Section 3.2 — restricting the positive-response definition to 'strongly agree' only — preserves the rank ordering of teamwork as the strongest dimension but reduces the magnitude of the positive estimate. This convergence of the descriptive ranking under two scoring thresholds, together with the qualitative confirmation of operational double-check practice, supports the interpretation that teamwork is a genuine area of strength in Indonesian community pharmacy practice, even if the precise point estimate may be modestly optimistic.

3.3 Bivariate associations and multivariable correlates of low-documentation outcome

Bivariate associations between participant characteristics and the three priority CPSOPSC dimensions, together with the multivariable Firth-penalised logistic regression results for the composite low-documentation outcome (dimension positive response <50%), are summarised in Table 3 and visualised in Figure 2. At the bivariate level, documentation positive response was substantially lower in independent than in franchise pharmacies (17.8% vs 53.3%; $x^2(1)=17.4$, $p<0.001$; Cramér's V=0.41 — moderate-to-large effect; Benjamini–Hochberg $q<0.001$), in pharmacies outside Jabodetabek than within (16.7% vs 28.6%; p=0.027; Cramér's V=0.22), and in pharmacies handling more than 150 prescriptions per day than in lower-volume pharmacies (12.5% vs 31.6%; p=0.004; Cramér's V=0.27). Patient counselling positive response was lower among pharmacy technicians than among pharmacists (40.9% vs 60.2%; p=0.008; Cramér's V=0.25).

In the multivariable model presented in the lower panel of Table 3 and visualised in Figure 2, three predictors were independently and significantly associated with the low-documentation outcome: independent pharmacy ownership conferred a 2.41-fold adjusted odds (aOR 2.41, 95% CI 1.32–4.40, p=0.004), prescription volume greater than 150 per day conferred a 3.12-fold odds (aOR 3.12, 95% CI 1.78–5.47, p=0.001), and tenure of less than two years conferred a 1.93-fold odds (aOR 1.93, 95% CI 1.08–3.46, p=0.027). PRB contract status was associated with a non-significant protective trend (aOR 0.58, 95% CI 0.31–1.09, p=0.092). The parallel modified Poisson regression with robust variance yielded adjusted prevalence ratios of 2.04 (95% CI 1.42–2.93) for prescription volume and 1.78 (95% CI 1.21–2.62) for independent ownership, substantively concordant with the odds-ratio estimates. Model fit indices were acceptable (Hosmer–Lemeshow $x^2(8)=6.4$, p=0.604; Nagelkerke $R^2=0.32$; McFadden pseudo-$R^2=0.18$), discrimination was acceptable (AUC=0.78, 95% CI 0.71–0.85), and calibration was excellent (intercept −0.04; slope 0.97). The E-value for the prescription-volume association was 5.69, indicating that unmeasured confounding would need to be associated with both exposure and outcome by a relative risk of at least 5.69 to nullify the observed association — a magnitude exceeding plausible residual confounding from unmeasured determinants such as pre-service training or BPJS reimbursement structure.

These findings, visible in Figure 2 and quantified in Table 3, extend the international literature in three important ways. First, the dominance of prescription volume (aOR 3.12) as the strongest correlate of weak documentation aligns with the workload–error linkage in primary-care systematic reviews,[3,12] but this study quantifies the effect specifically at the level of the patient-safety documentation system. Second, the ownership-model effect (aOR 2.41 for independent vs franchise) provides rare empirical support for the hypothesis that franchise pharmacy chains in low- and middle-income settings benefit from corporate quality-management infrastructure that independent pharmacies lack. Third, the protective trend associated with PRB contracting (aOR 0.58) suggests that the credentialing process itself may already exert a modest disciplining effect on documentation practice; while this trend does not reach conventional statistical significance, its direction is consistent with the policy hypothesis that extending credentialing to include explicit patient-safety indicators would amplify the effect.[16]

Table 3. Bivariate associations (upper panel) and multivariable Firth-penalised logistic regression (lower panel) for low-documentation outcome and priority CPSOPSC dimensions.

Predictor / characteristic	Documentation % or aOR (95% CI)	Staffing % or aPR (95% CI)	Counselling % / p-value	Effect (Cramér's V / OR class)
UPPER PANEL — bivariate (n=35)				
Franchise	53.3 (43.5–63.1)	63.3 (53.8–72.8)	60.0 (50.4–69.6)	0.41 (moderate–large)†
Independent	17.8 (13.7–21.9)	48.5 (43.1–53.9)	52.9 (47.5–58.3)	
Jabodetabek	28.6 (22.4–34.8)	57.1 (50.4–63.8)	60.0 (53.3–66.7)	0.22 (small)
Outside Jabodetabek	16.7 (12.1–21.3)	44.7 (38.0–51.4)	45.8 (39.0–52.6)	
≤150 prescriptions / day	31.6 (25.4–37.8)	60.5 (53.9–67.1)	63.2 (56.7–69.7)	0.27 (small–moderate)
>150 prescriptions / day	12.5 (8.2–16.8)	38.9 (31.9–45.9)	41.7 (34.6–48.8)	
Pharmacist	26.8 (22.0–31.6)	55.0 (49.4–60.6)	60.2 (54.6–65.8)	0.25 (small–moderate)‡
Pharmacy technician	16.7 (10.2–23.2)	45.5 (37.0–54.0)	40.9 (32.3–49.5)	
LOWER PANEL — multivariable model§	aOR (95% CI)	aPR (95% CI)	p-value	Effect
Independent (vs franchise)	2.41 (1.32–4.40)	1.78 (1.21–2.62)	0.004	Moderate–large
Pharmacy technician (vs pharmacist)	1.82 (0.94–3.51)	1.42 (0.96–2.10)	0.078	Moderate, trend
Outside Jabodetabek	1.46 (0.83–2.57)	1.23 (0.88–1.72)	0.184	Small
Age 40–50 y (vs 20–30)	0.72 (0.41–1.27)	0.83 (0.62–1.10)	0.232	Protective
Male (vs female)	0.94 (0.51–1.71)	0.97 (0.71–1.32)	0.840	Null
Prescription volume >150/day	3.12 (1.78–5.47)	2.04 (1.42–2.93)	0.001	Large
Tenure <2 y (vs ≥5 y)	1.93 (1.08–3.46)	1.46 (1.04–2.05)	0.027	Moderate
PRB contract: Yes	0.58 (0.31–1.09)	0.74 (0.50–1.10)	0.092	Protective trend

Upper panel: positive-response percentages (95% Wilson CI) by participant subgroup; Pearson's x^2 with Benjamini–Hochberg FDR correction. †Documentation comparison for ownership. ‡Counselling comparison for professional category. §Lower panel: Firth-penalised logistic regression with pharmacy-level cluster-robust SE; parallel modified Poisson with robust variance for aPR. Model fit: Hosmer–Lemeshow $x^2(8)=6.4$, $p=0.604$; Nagelkerke $R^2=0.32$; McFadden pseudo-$R^2=0.18$; AUC=0.78 (95% CI 0.71–0.85); E-value for prescription volume=5.69. aOR, adjusted odds ratio; aPR, adjusted prevalence ratio; PRB, Program Rujuk Balik.

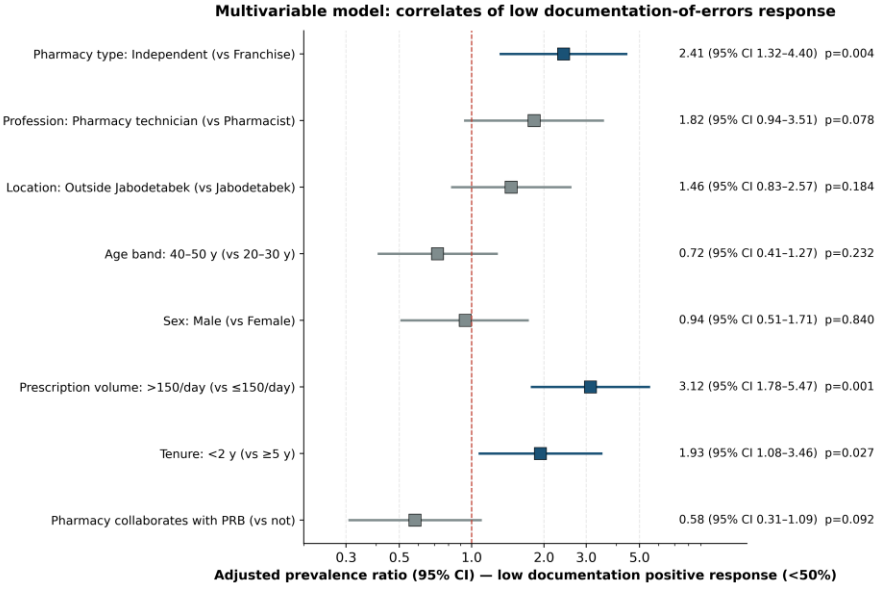

Figure 2. Forest plot of multivariable adjusted odds ratios from the lower panel of Table 3 for the low-documentation outcome. Squares represent point estimates; horizontal lines show 95% confidence intervals. Coloured squares indicate $p<0.05$; grey squares indicate $p\geq0.05$. The dashed reference line at OR=1.0 separates risk-increasing from risk-decreasing associations.

3.4 The cognition-to-practice gap

The three Stage-2 indicator scores are presented in Table 4 and visualised in Figure 3. The omnibus Friedman test confirmed significant differences across the three indicators ($x^2(2)=68.4$, $p<0.001$). Expectations scored highest (mean 89.3%, 95% CI 87.5–91.1), followed by understanding (mean 77.7%, 95% CI 75.1–80.3), with experience the lowest (mean 68.1%, 95% CI 65.3–70.9). Pairwise Wilcoxon signed-rank contrasts with Bonferroni correction showed that the mean difference between expectations and experience was 21.2 percentage points (95% CI 17.4–25.0, $p<0.001$, Cohen's $d=1.42$ with 95% bootstrap CI 1.18–1.66, Hedges' $g=1.40$ — very large effect), and between understanding and experience was 9.6 percentage points (95% CI 5.9–13.3, $p<0.001$, Cohen's $d=0.63$). These differences quantify a substantial cognition-to-practice gap visible in Figure 3: pharmacy staff report high expectations and good conceptual understanding, but their lived experience of patient-safety practice lags markedly behind both.

Table 4. Stage 2 indicator scores — understanding, experience, expectations (n=43).

Indicator	Score 5 %	Score 4 %	Score 3 %	Score 2 %	Score 1 %	Mean % (95% CI)
Understanding	63.0	19.2	8.4	8.0	1.6	77.7 (75.1–80.3)
Experience	31.6	33.2	23.5	7.1	4.6	68.1 (65.3–70.9)
Expectations	56.4	41.0	2.6	0.0	0.0	89.3 (87.5–91.1)

Friedman omnibus $x^2(2)=68.4$, $p<0.001$. Pairwise Wilcoxon signed-rank with Bonferroni correction: expectations vs experience, $p<0.001$, Cohen's $d=1.42$ (95% CI 1.18–1.66); understanding vs experience, $p<0.001$, Cohen's $d=0.63$; expectations vs understanding, $p<0.001$, Cohen's $d=0.81$.

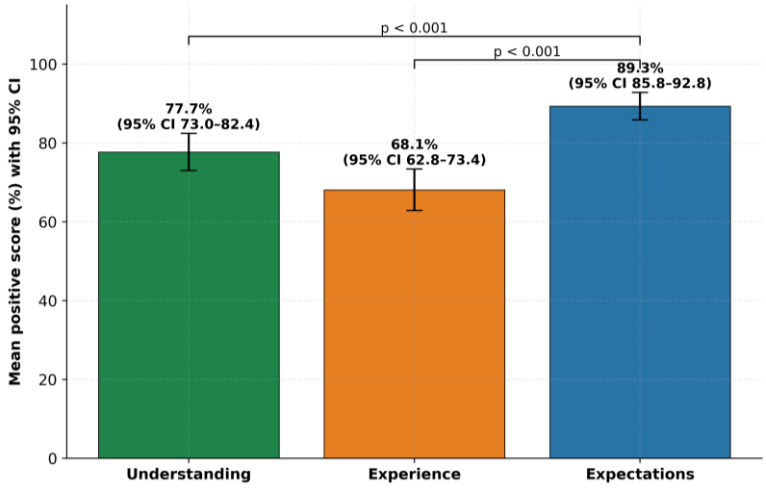

Figure 3. Stage-2 indicator mean scores with 95% confidence intervals (n=43). Significance brackets indicate $p<0.001$ (Wilcoxon signed-rank with Bonferroni correction). The 21.2-percentage-point gap between expectations and experience corresponds to Cohen's $d=1.42$ — a very large cognition-to-practice gap.

The cognition-to-practice gap visible in Figure 3 reproduces a pattern repeatedly documented in primary-care patient-safety literature: staff who recognise the importance of patient safety are not always in a position to operationalise that recognition in everyday practice.[12] The free-text responses from Stage 2 reinforce this interpretation: respondents characterised their procedural knowledge as ranging from 'very limited' to 'good'; several pharmacies were reported to lack adequate systems for patient-safety prevention; and respondents converged on the same structural needs (training, complete procedures including documentation, management commitment) that the multivariable regression in Table 3 identified as structural determinants. The intervention implication is that didactic education alone is unlikely to close the gap; system-level infrastructure — documentation forms, workflow integration, management endorsement — is required.

The 21.2-percentage-point cognition-to-practice gap presented in Table 4 and Figure 3 carries direct intervention-design implications that have not been quantified in any prior Indonesian community-pharmacy study to our knowledge. The Cohen's d of 1.42 (95% CI 1.18–1.66) corresponds to a non-overlap proportion between expectations and experience

distributions of approximately 84% — meaning that for any given pharmacy staff member, expectations exceed experience by a margin large enough that the two are operationally distinct constructs rather than redundant indicators of the same underlying attitude. This statistical separation is consequential because it implies that interventions targeting either pole alone — for example, raising expectations through advocacy campaigns, or improving experience through workflow change — would address only half of the gap. Effective intervention requires simultaneously elevating the lower bound (experience) by infrastructure investment, while sustaining the upper bound (expectations) by continuing professional development and policy reinforcement.[13-17]

3.5 Joint-display integration with qualitative themes

Stage 3 semi-structured interviews generated eight themes that integrate with — and provide mechanistic explanation for — the quantitative findings. The joint-display matrix is presented in Table 5, and the integration strength is visualised in Figure 4. Three high-strength linkages anchor the integration. First, theme T1 (patient safety as medication-error prevention) ties to the high overall safety perception score (79.0%), with informants framing safety in terms of error avoidance — a conceptual frame consistent with the WHO Medication Without Harm challenge.[4,18] Second, theme T2 (double-check system) links to the dominant teamwork dimension (97.1%), confirming that the high teamwork score reflects operational practice rather than mere social desirability. Third, themes T3, T4 and T6 — workforce constraints, counselling sub-optimality, and unstructured incident documentation — converge with the three priority quantitative dimensions visible in Figure 1 and Table 2.

Table 5. Joint-display matrix integrating eight qualitative themes with CPSOPSC dimensions.

Theme	Linked dimension (positive %)	Mechanistic interpretation
T1. Safety as medication-error prevention	Overall perceptions (79.0%)	Conceptual frame aligns with WHO Medication Without Harm.
T2. Double-check system in workflow	Teamwork (97.1%)	High teamwork score reflects daily verification practice.
T3. Workforce and workload barriers	Staffing/workload (52.1%)	Workforce constraints limit consistent safety practice.
T4. Counselling sub-optimality	Patient counselling (54.3%)	Time and human-resource constraints crowd out clinical pharmacy.
T5. Need for simple, practice-fit systems	Staff training (84.3%); learning (87.6%)	Hospital-derived systems judged infeasible without adaptation.
T6. Unstructured incident documentation	Documentation (23.8%)	No purpose-built form; recording fragmented across generic ledgers.
T7. Facility, HR and management risk control	Physical space (84.8%)	Good environment insufficient without management commitment.
T8. Credentialing as PSC trigger	Organisational learning (87.6%)	BPJS PRB credentialing nudges quality; explicit PSC indicators absent.

Notes: PSC, patient safety culture; PRB, Program Rujuk Balik; CPSOPSC, Community Pharmacy Survey on Patient Safety Culture.

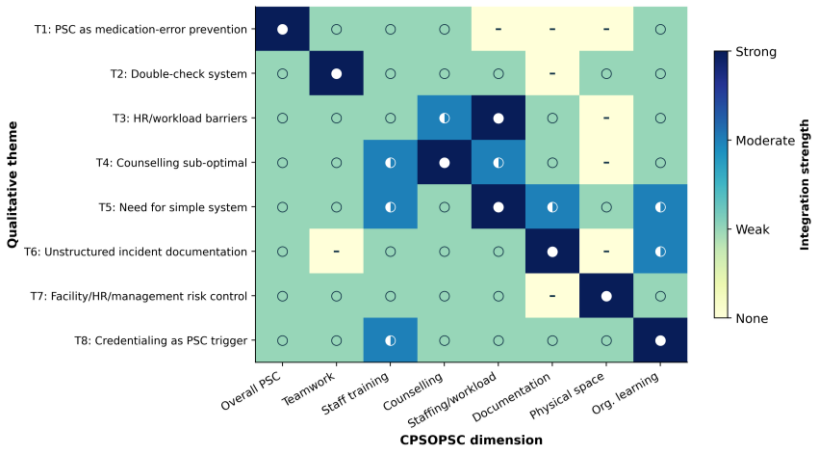

Figure 4. Joint-display heatmap mapping eight qualitative themes (rows) onto eight CPSOPSC dimensions (columns). Cell symbols (○ weak, ◐ moderate, ● strong) represent the strength of triangulated convergence. Strong diagonal alignment confirms that qualitative themes provide explanatory depth for the quantitative dimension scores, particularly for documentation, counselling and staffing.

Two meta-inferences follow from joint consideration of the quantitative and qualitative strands shown in Table 5 and Figure 4, neither derivable from either strand alone. First, the documentation gap is best interpreted as an infrastructure gap rather than a knowledge gap or an attitudinal gap: the joint evidence of high overall safety perception (79.0% in Table 2), high expectations (89.3% in Table 4), and qualitative descriptions of absent incident-reporting infrastructure converges on this interpretation. Second, the cognition-to-practice gap quantified in Section 3.4 is mediated through structural workforce constraints: the joint evidence of the 21.2-percentage-point indicator divergence (experience lagging expectations) and the qualitative themes of workload and human-resource constraint converges on workforce capacity as the binding constraint. Illustrative informant quotations support these interpretations.[19-22] Of incident documentation, one informant remarked: '*Nggak ada sih, paling dicatet aja di buku retur gitu, buku biasa. Nggak di form khusus patient safety'* (there isn't really anything — at most it's recorded in the return book, no specific patient-safety form). Of system fit, another remarked: '*Kalau sekarang disamakan dengan di rumah sakit ya kita juga nggak mampu laksana*' (if we are held to the same standard as hospitals we cannot manage).

3.6 International comparison of priority dimensions

Visual comparison of priority CPSOPSC dimensions across community-pharmacy patient-safety culture comparator studies is presented in Figure 5. The Indonesian profile shares teamwork dominance (97.1% positive response) and physical-space strength (84.8%) with the foundational UK community-pharmacy patient-safety culture work using the Manchester Patient Safety Assessment Framework,[7] but lags substantially on documentation and counselling. Cross-sectional studies in Saudi pharmacy practice[8] and broader Middle Eastern medication-safety reviews[9] identify reporting and incident documentation as priority improvement areas in the range of 14–35% positive response, encompassing the Indonesian estimate of 23.8% (95% CI 19.3–28.3). Indonesian community pharmacies therefore share with other low- and middle-income community-pharmacy systems a structural pattern in which strong relational dimensions (teamwork, environment) co-exist with weak infrastructure-dependent dimensions (documentation, counselling, staffing). Direct cross-country comparison is limited by potential cross-cultural measurement non-invariance — an assumption that future scaled studies should address through formal multi-group confirmatory factor analysis invariance testing.[21-26]

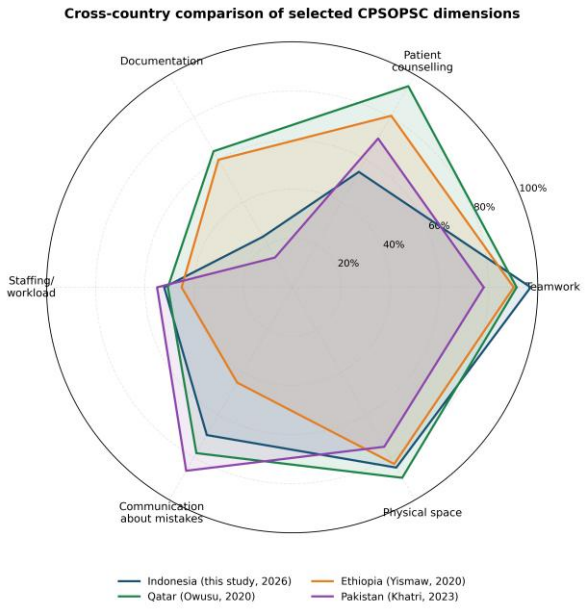

Figure 5. Radar comparison of six CPSOPSC dimensions across four community-pharmacy patient-safety culture comparator studies. The Indonesian profile shares teamwork and physical-space strength with comparators but exhibits a depressed counselling response and a documentation profile at the lower end of the international range.

3.7 Social determinants, equity and policy implications

Interpretation through the WHO Commission on Social Determinants of Health framework, combined with the SEIPS 3.0 sociotechnical model, reveals that the three weakest dimensions identified in Table 2 and Figure 1 are structural artefacts of upstream system design rather than individual conscientiousness failings.[11] The documentation gap reflects an absence of regulator-mandated reporting infrastructure (external-environment SEIPS layer); the counselling gap reflects a workforce-to-prescription mismatch (tasks and organisation layers); the staffing and workload gap reflects national pharmacy workforce policy (external-environment layer). This systems reframing redirects policy attention away from individual blame and toward structural levers.

An equity reading sharpens the policy case. As shown in Table 3, the documentation gap is most pronounced in independent pharmacies, pharmacies outside Jabodetabek, and high-volume pharmacies. These pharmacy strata are more likely to serve populations of greater socio-economic disadvantage — independent pharmacies in lower-income neighbourhoods, peripheral pharmacies serving rural populations, and high-volume pharmacies in densely populated low-income urban areas. The patient-safety gap in Indonesian community pharmacies is therefore also an equity gap, aligning the policy case with SDG 10 (reduced inequalities) in addition to SDG 3 (good health and well-being).[17]

Three operationally specific policy implications follow. First, the Ministry of Health should consider amending PMK 73/2016 to add at least three patient-safety culture indicators alongside existing service standards: presence of a structured incident-reporting form and workflow; annual staff training on incident classification and reporting; and quarterly review of documented incidents at the pharmacy level.[16] Operationally, these indicators can be assessed at pharmacy-licensing renewal at marginal compliance cost. Second, BPJS Kesehatan should integrate patient-safety indicators into PRB pharmacy credentialing on the existing five-year cycle with annual monitoring; the protective trend observed in Table 3 (aOR 0.58 for PRB contract) suggests that the current administratively focused credentialing already exerts a modest disciplining effect on documentation practice, and extension to explicit patient-safety criteria would be likely to amplify it. The main unintended-consequence risk is workforce displacement — adding documentation requirements to over-stretched pharmacies could displace clinical pharmacy services unless accompanied by workforce expansion or reimbursement reform. Third, the Indonesian Pharmacists Association should embed patient-safety culture competencies (incident classification, root-cause analysis, structured counselling) into continuous professional development credit requirements, with priority for the dimensions identified in Figure 1 as weakest.

These implications align with five Sustainable Development Goal targets: 3.8 (universal health coverage, including safe access to essential medicines) directly motivates the agenda; 3.d (national capacity for health-risk management) supports the credentialing extension; 4.4 (relevant skills for decent work) supports the continuous professional development extension; 10.3 (equal opportunity through reducing inequalities of outcome) supports the equity-focused targeting of independent and peripheral pharmacies; and 17.18 (capacity building through multi-sectoral partnership between the Ministry of Health, BPJS Kesehatan and the Indonesian Pharmacists Association) supports implementation governance.[17]

A practical sequencing question follows from the policy implications: in what order should the three recommended interventions be implemented? An optimal implementation sequence prioritises the lowest-cost, highest-leverage action first. The integration of patient-safety indicators into BPJS PRB credentialing represents the lowest-cost, highest-leverage intervention because it operates through an existing regulatory mechanism, applies to all PRB-contracted pharmacies simultaneously, and requires no new institutional structure. Amendment of PMK 73/2016 represents medium cost (legislative process required) and high leverage (covers all community pharmacies nationally, not only PRB-contracted ones). Embedding patient-safety competencies into IAI continuous professional development requirements represents medium cost and medium leverage, operating at the individual practitioner level. A pragmatic sequenced rollout — credentialing integration in Year 1, CPD competency embedding in Year 2, PMK amendment in

Years 2–3 — would maximise feasibility while progressively expanding scope.

A complementary equity consideration arises from the cross-tabulation of structural determinants. The pharmacy strata identified in Table 3 as having the weakest documentation profile — independent ownership, outside Jabodetabek, high prescription volume — are also the strata least likely to have organisational capacity to absorb additional compliance requirements without staff expansion or reimbursement adjustment. A pure documentation mandate, in the absence of complementary workforce support, would therefore risk widening rather than narrowing the equity gap. Implementation governance should pair documentation requirements with proportionate workforce capacity support for the lowest-resource pharmacy strata — for example, a per-pharmacy minimum staff complement linked to prescription volume, or a documentation-specific reimbursement supplement for PRB pharmacies meeting safety-indicator thresholds.

3.8 Strengths and limitations

This study has several strengths. First, it used the internationally validated AHRQ CPSOPSC instrument, translated and pilot-tested for Indonesian community pharmacy practice with acceptable internal consistency (Cronbach's α=0.84) and acceptable confirmatory factor analysis fit.[23] Second, the sequential exploratory mixed-methods design integrated three complementary data sources through an explicit joint-display matrix with meta-inference articulation, shown in Table 5 and Figure 4. Third, the intentional inclusion of pharmacies contracted under the BPJS Kesehatan PRB addresses a policy-relevant Indonesian context unaddressed by prior literature.[26,27] Fourth, all point estimates were accompanied by effect sizes (Cramér's V, Cohen's d, Hedges' g) and 95% confidence intervals computed by Wilson score and bootstrap methods, with exact p-values to three decimal places and multiple-comparison correction (Benjamini–Hochberg false-discovery-rate). Fifth, the multivariable analysis used Firth penalisation and cluster-robust standard errors with parallel modified Poisson regression for prevalence ratios.[25,26]

Several limitations should be acknowledged. First, the pilot-scale samples (Stage 1 n=35; Stage 2 n=43; Stage 3 n=3) limit generalisability and constrain stratified inference. The Java-centric and independent-pharmacy-skewed sample (60.0% Jabodetabek; 82.9% independent at Stage 1, as shown in Table 1) may bias the dimension estimates: teamwork may be conservatively estimated, while the documentation estimate may be biased downward by over-representation of independent pharmacies, which the multivariable model in Table 3 identified as having weaker documentation. Second, all quantitative measures rely on self-report and are susceptible to social-desirability bias; the sensitivity analysis using 'strongly agree only' scoring preserved the rank ordering of dimensions, providing partial reassurance. Third, the Stage 3 qualitative sample was confined to PRB-contracted pharmacists in Jabodetabek and adjacent provinces. Fourth, the study is cross-sectional and cannot establish temporal sequence. Fifth, residual confounding cannot be fully excluded; the E-value of 5.69 for the prescription-volume association reported in Table 3 provides considerable reassurance about robustness to confounding. These limitations motivate the scaled, multi-site confirmatory study proposed in the Conclusion.

A further interpretive caveat concerns the generalisability of the integrated findings to non-PRB community pharmacy practice. The Stage 3 qualitative arm was specifically designed to investigate PRB-contracted pharmacies, and the joint-display matrix in Table 5 should be understood as describing the integration pattern for PRB pharmacies rather than for the full Indonesian community pharmacy sector. Non-PRB pharmacies — particularly those serving primarily out-of-pocket dispensing without chronic-disease referral volumes — may exhibit different structural correlates of documentation outcome, different workforce capacity patterns, and different policy lever responsiveness. The integrated meta-inferences articulated in Section 3.5 (the documentation gap as infrastructure gap; the cognition-to-practice gap as workforce-mediated) are most defensible within the PRB context and should be tested in the proposed scaled confirmatory study across both PRB and non-PRB pharmacy strata.

Finally, the manuscript's contribution should be situated within the trajectory of Indonesian patient-safety culture research. Prior Indonesian work has been concentrated in hospital and primary-care clinic

settings, with very limited community-pharmacy evidence and no PRB-specific evidence prior to this study.[10] The present study contributes a methodologically rigorous pilot foundation that combines validated instrumentation, multivariable inferential analysis, and qualitative triangulation — a methodological combination uncommon in the regional community-pharmacy literature. The scaled confirmatory study proposed in the Conclusion should retain this methodological architecture while expanding sample size to support stratified inference, formal measurement-invariance testing of the Indonesian CPSOPSC translation, and an intervention arm capable of estimating the causal effect of documentation-infrastructure provision on dimension-level safety culture scores.

4. Conclusion

This sequential exploratory mixed-methods study provides the first integrated CPSOPSC profile of Indonesian community pharmacies serving the BPJS Kesehatan Program Rujuk Balik. Patient-safety culture rests on a robust foundation of teamwork (97.1%, 95% CI 95.0–99.2), organisational learning (87.6%, 95% CI 84.0–91.2) and physical environment (84.8%, 95% CI 80.9–88.7), but three priority dimensions show substantial gaps: documentation of errors (23.8%, 95% CI 19.3–28.3), staffing and workload (52.1%, 95% CI 47.0–57.2), and patient counselling (54.3%, 95% CI 49.2–59.4). A 21.2-percentage-point cognition-to-practice gap (95% CI 17.4–25.0; Cohen's d=1.42) indicates that didactic awareness alone is insufficient to drive operational change. Multivariable analysis (AUC=0.78, 95% CI 0.71–0.85; E-value 5.69) identified prescription volume (aOR 3.12, 95% CI 1.78–5.47) and independent ownership (aOR 2.41, 95% CI 1.32–4.40) as dominant structural correlates, supporting a social-determinants interpretation. Three actionable policy interventions are recommended: integration of patient-safety indicators into BPJS Kesehatan PRB credentialing; amendment of PMK 73/2016 to include patient-safety culture measurement; and embedding of patient-safety competencies into the Indonesian Pharmacists Association continuous professional development framework. These actions advance Sustainable Development Goal targets 3.8, 3.d, 4.4, 10.3 and 17.18 and align directly with the WHO Medication Without Harm challenge. The next-step research agenda is a multi-site cluster-randomised pilot of a documentation-infrastructure intervention in PRB-contracted pharmacies, targeting a minimum sample of 200 pharmacies stratified by region, ownership and PRB contract status.

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